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What is claimed is:

1. A system for deciding a bid item for which a bid is made, comprising:

a data memory for storing a logical formula representing a relationship among a plurality of bid items, a value table containing a value of each of the bid items, price information of each of the bid items in at least one market, a total purchasing fund, and a bidding strategy;

a profit computation section for computing a profit obtainable when at least one bid item arbitrary selected from the plurality of bid items is purchased, based on the value and the price information of the at least one bid item; and

a strategy computation section for determining at least one bid item for which a bid should be made and a gross profit obtainable from the determined at least one bid item, wherein the strategy computation section selects a combination candidate from the plurality of bid items based on the relationship formula, instructs the profit computation section to compute a possible profit obtainable from the selected combination candidate, and determines the at least one bid item so as to maximize the possible profit within the total purchasing fund.

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2. The system according to claim 1, wherein the logical formula represents a logical OR of the plurality of bid items, wherein the strategy computation section determines a subset of bid items from the plurality of bid items so as to maximize the possible profit within the total purchasing fund.

3. The system according to claim 1, wherein the logical formula represents a logical exclusive-OR of the plurality of bid items, wherein the strategy computation section determines a single bid item of the plurality of bid items so as to maximize the possible profit within the total purchasing fund.

4. The system according to claim 1, wherein the logical formula represents a logical AND of the plurality of bid items, and the value table further containing an added combinatorial value which will be obtained only when the plurality of bid items are all purchased, wherein the strategy computation section determines a list of bid items so as to maximize the possible profit within the total purchasing fund.

5. The system according to claim 1, wherein the logical formula represents any combination of a logical OR, a logical exclusive-OR, and a logical AND of the plurality of bid items,

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the logical OR represents a desire to maximize the possible profit within the total purchasing fund to obtain a subset of bid items from the plurality of bid items,

5           the logical exclusive-OR represents a desire to determine  
a single bid item of the plurality of bid items so as to maximize  
the possible profit within the total purchasing fund, and

the logical AND represents that a combinatorial value will be obtained only when a plurality of bid items related to the logical AND are all purchased.

6. The system according to claim 1, wherein the strategy computation section further establishes a bidding strategy taking into consideration a possible rise of a bidding price of each of the bid items due to participation of a third party to the bidding in the future.

7. An automated bidding system comprising:

a price collection device for automatically collecting price information of a bid item for which a bid is made in at least one market at regular intervals;

20           a bid decision system comprising:

a data memory for storing a logical formula representing a relationship among a plurality of bid items, a value table containing a value of each of the bid items, the price information

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of each of the bid items, a total purchasing fund, and a bidding strategy;

a profit computation section for computing a profit obtainable when at least one bid item arbitrary selected from the plurality of bid items is purchased, based on the value and the price information of the at least one bid item; and

a strategy computation section for determining at least one bid item for which a bid should be made and a gross profit obtainable from the determined at least one bid item, wherein the strategy computation section selects a combination candidate from the plurality of bid items based on the relationship formula, instructs the profit computation section to compute a possible profit obtainable from the selected combination candidate, and determines the at least one bid item so as to maximize the possible profit within the total purchasing fund; and

a bidding device performing a bid for the determined at least one bid item.

8. A bid supporting system comprising:

a market observation device for automatically collecting price information of a bid item for which a bid is made in at least one market at regular intervals;

a bid decision system comprising:

a data memory for storing a logical formula representing

5           a profit computation section for computing a profit obtainable when at least one bid item arbitrary selected from the plurality of bid items is purchased, based on the value and the price information of the at least one bid item; and

a strategy computation section for determining at least one bid item for which a bid should be made and a gross profit obtainable from the determined at least one bid item, wherein the strategy computation section selects a combination candidate from the plurality of bid items based on the relationship formula, instructs the profit computation section to compute a possible profit obtainable from the selected combination candidate, and determines the at least one bid item so as to maximize the possible profit within the total purchasing fund; and

a bid recommendation device for representing the  
20 determined at least one bid item as recommendable information  
reflecting price variations in the market.

9. The automated bidding system according to claim 7, wherein the relationship formula, the value table, and the total purchasing fund are allowed to be updated with a lapse of time.

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11. The automated bidding system according to claim 7,  
5 further comprising a mobile agent, wherein, after the  
relationship formula, the value table, the total purchasing fund,  
and the bidding strategy have been input, the automated bidding  
system is transferred from a user's computer to a continuously  
operating computer to allow periodical market observation.

10           12.     The bid supporting system according to claim 8,  
further comprising a mobile agent, wherein, after the  
relationship formula, the value table, the total purchasing fund,  
and the bidding strategy have been input, the bid supporting  
system is transferred from a user's computer to a continuously  
15     operating computer to allow periodical market observation.

13. A method for deciding a bid item for which a bid is made, comprising the steps of:

a) storing a logical formula representing a relationship among a plurality of bid items, a value table containing a value of each of the bid items, price information of each of the bid items in at least one market, a total purchasing

b) determining at least on bid item for which a bid should be made and a gross profit obtainable from the determined at least one bid item, so as to maximize a possible profit obtainable from a combination candidate selected from the plurality of bid items based on the relationship formula within the total purchasing fund.

the step (b) comprises the steps of:

b.2) determining whether a total of present prices of the bid items in the set G is not greater than the total purchasing fund;

b.4) when the total of present prices of the bid items in the set G is greater than the total purchasing fund,

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computing a possible profit obtainable from a combination candidate selected from the set G based on the relationship formula within the total purchasing fund to determine a best combination S of bid items in the set G under the bidding strategy  
5 to output a list of bid items in the set G and the possible profit obtained therefrom.

15. The method according to claim 13, wherein the logical formula represents a logical exclusive-OR of the plurality of bid items,

10 the step (b) comprises the steps of:

b.1) determining whether one of the plurality of bid items is in bid;

b.2) when an in-bid item exists, outputting the in-bid item and a profit obtained from the in-bid item;

15 b.3) when no in-bit item exists, computing a profit obtainable from each of bid items included in the relationship formula; and

b.4) determining a best bid item based on the profit of each of bid items, the total purchasing fund, and the bidding  
20 strategy to output the bid item and the profit obtained therefrom.

16. The method according to claim 13, wherein the logical formula represents a logical AND of the plurality of



1. The first part of the paper discusses the importance of the research and the objectives of the study.

2. The second part of the paper discusses the methodology used in the study.

3. The third part of the paper discusses the results of the study.

4. The fourth part of the paper discusses the conclusions of the study.

5. The fifth part of the paper discusses the implications of the study.

5                   b.1) producing a set G which is a sum of a first  
set including items each having a present price equal to or lower  
than the value thereof and a second set of bid items each being  
in bid;

b.3) when the total of present prices of the bid items in the set G is not greater than the total purchasing fund at the step (b.2), determining whether a total of present prices of bid items included in the relationship formula is not greater than the total purchasing fund;

b.5) when the total of present prices of bid items included in the relationship formula is greater than the total purchasing fund at the step (b.3), determining a best combination

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S of bid items from the set G under the bidding strategy to output a list of bid items in the best combination S and the possible profit obtained therefrom;

b.6) when the total of present prices of the bid items in the set G is greater than the total purchasing fund at the step (b.2), computing a possible profit obtainable from a combination candidate selected from the set G based on the relationship formula within the total purchasing fund, taking into consideration the added value, to determine a best

combination S of bid items in the set G under the bidding strategy to output a list of bid items in the set S and the possible profit obtained therefrom.

17. The method according to claim 13, wherein the logical formula represents any combination of a logical OR, a logical exclusive-OR, and a logical AND of the plurality of bid items, wherein

the logical OR represents a desire to maximize the possible profit within the total purchasing fund,

the logical exclusive-OR represents a desire to determine a single bid item of the plurality of bid items so as to maximize the possible profit within the total purchasing fund, and

the logical AND represents that an added value will generate only when a plurality of bid items related to the logical AND are all purchased,

b.1) producing  $2^x$  possible states, where  $x$  is the number of all the items, wherein each of the possible states indicates that a bid item is to be purchased or not to be

b.2) removing a possible state purchasing both items relating to the exclusive OR from the  $2^x$  possible states to produce a set of possible states; and

18. The method according to claim 13, wherein a bidding strategy is established taking into consideration a possible rise of a bidding price of each of the bid items due to participation of a third party to the bidding in the future.

a) storing a logical formula representing a relationship among a plurality of bid items, a value table

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b) collecting price information of the bid items  
5 from the market to update the price information stored at regular  
intervals:

o) determining at least on bid item for which a bid should be made and a gross profit obtainable from the determined at least one bid item, so as to maximize a possible profit obtainable from a combination candidate selected from the plurality of bid items based on the relationship formula within the total purchasing fund;

d) outputting a list of the determined at least one bid item; and

15 e) automatically bidding based on the list of the determined at least one bid item.

20. A bid supporting method comprising the steps of:

a) storing a logical formula representing a relationship among a plurality of bid items, a value table containing a value of each of the bid items, price information of each of the bid items in at least one market, a total purchasing fund, and a bidding strategy;

b) collecting price information of the bid items from the market to update the price information stored at regular

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intervals;

c) determining at least on bid item for which a bid should be made and a gross profit obtainable from the determined at least one bid item, so as to maximize a possible profit

5 obtainable from a combination candidate selected from the plurality of bid items based on the relationship formula within the total purchasing fund;

d) outputting a list of the determined at least one bid item; and

10 e) representing the determined at least one bid item as recommendable information reflecting price variations in the market.

21. The automated bidding method according to claim 19, wherein the relationship formula, the value table, and the total  
15 purchasing fund are allowed to be updated with a lapse of time.

22. The bid supporting method according to claim 20, wherein the relationship formula, the value table, and the total purchasing fund are allowed to be updated with a lapse of time.

23. The automated bidding method according to claim 19,  
20 further comprising a mobile agent, wherein, after the relationship formula, the value table, the total purchasing fund, and the bidding strategy have been input, a whole system implementing the automated bidding method is transferred from

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a user's computer to a continuously operating computer to allow periodical market observation.

24. The bid supporting method according to claim 20, further comprising a mobile agent, wherein, after the relationship formula, the value table, the total purchasing fund, and the bidding strategy have been input, a whole system implementing the automated bidding method is transferred from a user's computer to a continuously operating computer to allow periodical market observation.

25. A computer-readable recording medium storing a computer program for deciding a bid item for which a bid is made, the computer program comprising the steps of:

a) storing a logical formula representing a relationship among a plurality of bid items, a value table containing a value of each of the bid items, price information of each of the bid items in at least one market, a total purchasing fund, and a bidding strategy; and

b) determining at least one bid item for which a bid should be made and a gross profit obtainable from the determined at least one bid item, so as to maximize a possible profit obtainable from a combination candidate selected from the plurality of bid items based on the relationship formula within the total purchasing fund.

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27. A computer-readable recording medium storing a computer program for bid supporting method comprising the steps

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of:

a) storing a logical formula representing a relationship among a plurality of bid items, a value table containing a value of each of the bid items, price information of each of the bid items in at least one market, a total purchasing fund, and a bidding strategy;

b) collecting price information of the bid items from the market to update the price information stored at regular intervals:

c) determining at least on bid item for which a bid should be made and a gross profit obtainable from the determined at least one bid item, so as to maximize a possible profit obtainable from a combination candidate selected from the plurality of bid items based on the relationship formula within the total purchasing fund;

d) outputting a list of the determined at least one bid item; and

e) representing the determined at least one bid item as recommendable information reflecting price variations in the market.

28. A method for deciding a bid item for which a bid is made, comprising the steps of:

a) storing a logical formula representing a logical OR of two bid items X and Y, a value table containing values



5                   b) determining whether  $y < y_m$  (hereafter, called  
Condition 1) is satisfied:

d) determining whether  $y - y_m < x - x_m$  (hereafter, called Condition 3) is satisfied;

f) determining whether  $x + y > T$  (hereafter, called Condition 5) is satisfied:

h) determining that the bid item Y should not be purchased in one of cases where the Condition 1 is not satisfied, where the Condition 1 is satisfied, the Conditions 2 and 3 are not satisfied, and the Conditions 4 and 6 are satisfied, and where the Condition 1 is satisfied, the Conditions 2-5 are not satisfied, and the Condition 6 is satisfied; and

25           1) determining that the bid item Y should be  
purchased in one of cases where the Conditions 1 and 2 are  
satisfied, where the Condition 1 is satisfied, the Condition  
2 is not satisfied, and the Condition 3 is satisfied, where the

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Condition 1 is satisfied, the Conditions 2 and 3 are not satisfied, the Condition 4 is satisfied, and the Condition 6 is not satisfied, and where the Condition 1 is satisfied and the Conditions 2-6 are not satisfied.

5           29.    A method for deciding a bid item for which a bid is made, comprising the steps of:

                  a) storing a logical formula representing a logical AND of two bid items X and Y, a value table containing values xm and ym of respective ones of the bid items X and Y, present  
10   prices x and y of respective ones of the bid items X and Y, an added value xym obtainable when the items X and Y are both purchased, a total purchasing fund T, and a constant p2 determined by a bidding strategy;

                  b) determining whether  $y < ym$  (hereafter, called  
15   Condition 1) is satisfied;

                  c) determining whether  $y > xym - xm$  (hereafter, called Condition 2) is satisfied;

                  d) determining whether  $x + y > xym$  (hereafter, called Condition 3) is satisfied;

20                e) determining whether  $y > p2 * xym - p2 * x + ym$  (hereafter, called Condition 4) is satisfied;

                  f) determining that the bid item Y should be purchased in one of cases where the Condition 1 is satisfied and where the Conditions 1-4 are not satisfied; and

25                g) determining that the bid item Y should not be

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purchased when the Condition 1 is not satisfied and one of the  
Conditions 2-4 is satisfied.

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